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Scientists, the Public and the Party Under Gorbachev by Paul Josephson

The Soviet research and development apparatus is the largest in the world in terms of numbers of scientists, engineers, and institutions. From the first days of the Revolution, Soviet leaders, believing that science would play a crucial role in the "construction of communism," supported its development by establishing research institutes with relatively assured financing. Yet by many standards, Soviet science has failed to perform effectively. Soviet physicists and chemists have won only eight Nobel prizes, and according to scientific citation indices, the rate at which western scholars cite their Soviet colleagues does not reflect the quantity of Soviet scientific journals. The system has proved capable of pioneering efforts in space (Sputnik), nuclear fusion (Tokamaks) and fission, and elementary particle and theoretical physics. But it has often been incapable of maintaining a lead or catching up in areas where it was behind. These failings result from structural, ideological, and administrative impediments to successful scientific performance that are part of the Stalinist legacy. The centerpiece of *perestroika* in science under Gorbachev is a series of wideranging, ad hoc, and as yet incomplete reforms intended to overcome these problems.

The Stalinist system for the administration of science was based on centralized organs of control and funding, ideological interference, and autarkic relations with the West. In the 1930s, the Communist Party asserted its control over scientists and engineers by dismantling or subjugating all professional organizations to its control. It required the formulation of five-year plans emphasizing applied science and technology at the expense of fundamental research. The Party's agent in the institute, the Primary Party Organization (PPO), ensured compliance with dictates from above, while seminars on dialectical materialist methodology and epistemology sought to foster ideological conformity in the natural sciences. In the period before Stalin's death, this interference was manifested

in wholesale arrests and executions, attacks on relativity theory and quantum mechanics, and the destruction of genetics under T. D. Lysenko, the quack biologist who rejected Darwinian notions of evolution. The goal was to create a non-exploitative "socialist" science that avoided the duplication of effort, ivory-tower impracticality, and inherent philosophical idealism of "bourgeois" science. Contacts with western scholars and journals, so painstakingly reestablished after the Revolution, virtually ceased. It became dangerous to publish in western journals or even to send reprints abroad. Scholars were accused of *nizkopoklonstvo* ("kowtowing"), even of "wrecking," terrorism, and spying, for suggesting that western science was more advanced. The result was the formation of an internationally isolated, administratively top-heavy, ineffective system of research.

During the Khrushchev and Brezhnev years, scientists succeeded to an extent in dismantling the Stalinist system of science administration. The resulting system exhibits more similarities than differences to those of western countries — with a few notable exceptions. First, the barriers between fundamental science, applied science, and education are quite rigid in the USSR. Second, Party and intelligence organizations maintained vigilant scrutiny of western journals and scientists, significantly retarding the flow of information between the West and the USSR, and restricted travel of Soviet scholars to the West. Third, the emphasis on applied science inhibited the development of new fields of fundamental research. Reforms instituted in the 1960s and 1970s were intended to improve scientific research productivity and speed up economic innovation. But the Party proved unwilling to cede control to scientists, and the research and development apparatus grew increasingly bureaucratized and dominated by conservative administrator/scientists and their institutions and by excessive reporting requirements.



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On the other hand, under Khrushchev and Brezhnev, scientists regained control of the philosophy of science, rejecting ideological interference in an October 1958 all-union conference in Moscow. The authority of scientists, in particular physicists, rose to new heights, especially after the successes of Sputnik and nuclear power and the advent of the so-called scientific-technological revolution. The public embraced these achievements as evidence that the vision of the communist future might soon be reached, while the Party turned to science to combat falling industrial production labor productivity.

Science Policy Under Gorbachev

In a process initiated from above immediately after Gorbachev's accession to power, leading party officials and scientists have advanced a series of measures based on a complete rejection of the Stalinist legacy. These are intended to invigorate research and development, revitalize leadership, and reestablish contacts with western scholars. As in other areas of society and the economy, the reforms are based on the concepts of decentralization and democratization. What sets science apart is the fact that scientists' specialized knowledge gives them greater say in the reform of their discipline. And owing to the scientific tradition of the free exchange of ideas, scientists tend to be more radical and socially conscious than other members of society.

One point of the scientific reforms is the decentralization of administration and funding in order to engender competition among scientific centers, encourage development of new fields of research, especially in biotechnology, computers, lasers, and communications, and stimulate economic growth. R & D is apportioned among the Academy of Sciences, where most fundamental research is performed; industrial ministries, where the bulk of applied research occurs; and universities and other higher educational institutions (*vuzy*) with training functions. Macrolevel science policy is formulated primarily in four bodies: the Central Committee science department, the Academy of Sciences, the State Committee for Science and Technology (*Gosudarstvennyi komitet po nauke i tekhnike*, or GKNT), and the State Planning Agency, GOSPLAN. It is implemented at the microlevel by Primary Party Organizations (PPOs) and institute academic councils.

The Academy and GKNT deal with policy for fundamental research. By virtue of its history, prestige, and status, the Academy plays the more important role. GKNT has no research capacity, a relatively small budget, and little administrative clout with branch ministries. In addition, it faces opposition from GOSPLAN which views many of GKNT's efforts as intrusions into its own jurisdiction. The Central

Committee science department is more concerned with ideology in the social sciences and has little scientific expertise, and so the Party usually defers to the Academy and GKNT in matters of science policy.¹ This structure is an impediment to reform: divided responsibilities and bureaucratic inertia preclude coordination, inhibit fundamental research, slow the pace of applied research into production, and separate training from research.

A first step in the reform process was the decentralization of finance. In the past, support for fundamental research came in the form of rather stable block funding. Now there is discussion of basing grants and contracts on peer review, with funding going to projects, not institutions. Funding would come from an organization resembling the National Science Foundation in the United States. There has also been talk of putting fundamental research institutes on *khozraschet*, "self-financing" based loosely on market concepts. The effort to make institutes more cost-effective must include the right to fire redundant, underused workers. Academic councils will have to assume greater responsibility for the financial success — or failure — of their institutes.² Institutes will be required to do more research under contract with various organizations and enterprises and to secure grants from the government and scientific societies to supplement their normal budgets. Those that fail to do so will fall by the wayside.

Firing of workers and closing down of unprofitable institutes no doubt will draw opposition from the scientific community. Some scientists attack "cost accounting" as a cover for Brezhnevite stress on practical applications of research, while virtually all scholars condemn the notion of *khozraschet* for fundamental research. It is clear that the government will continue to guarantee support of applied research for important economic programs. It has recognized the need to provide increased funding for fundamental research in the so-called priority program through the designation of some twenty-five principal research areas ranging from plasma physics to recombinant DNA research.

Research institutes have responded variously to decentralization. The new directors of the Leningrad Physico-technical Institute (LFTI) have emphasized economic rationality in their reform program. Believing that the past system of finance to be inefficient, they turned to the economics department of Leningrad State University for advice. The recommendations they received included ways to defend the interests of the institute in contractual agreements with higher standing instances in view of the vagaries of supply in the Soviet system and unclear legal precedent, and the decision to base hiring and firing on microeconomic considerations. Before *perestroika*, directors were concerned more with ensuring against violations of complex hiring, supply, and reporting laws, than with research efficiency. LFTI's discharging of

1 See Stephen Fortescue, *The Communist Party and Soviet Science* (Baltimore: Johns Hopkins University Press, 1986), 79-80, 91, and "The Soviet Academy of Sciences Under Gorbachev," *Australian Slavonic and East European Studies*, Vol. 1, No. 2 (1987), 1-28; and Peter K. Kneen, "Soviet Science Policy Under Gorbachev," *Soviet Studies*, Vol. XLI, no. 1 (January 1989), 67-87.

2 A. Golovkov, I. Lomakin, "Nauka: khozraschet i gosudarstvennaya podderzhka," *Kommunist*, 5 (March 1989), pp. 86-89.

redundant workers permitted a salary increase for the most highly-qualified workers, but it did not make the new administration popular with the staff.³

Institutes have also begun to combat the "gigantomania" that plagues Soviet science. Throughout Soviet history, the tendency has been to establish research institutes for each promising field. Successful directors who realized that they could take advantage of the institutional momentum engendered by the Stalinist system built huge and often unmanageable research empires based on (and often dominating) single disciplines. (For example, Nobel prizewinner N. G. Basov tried to transform the Physics Institute of the Academy of Sciences (FIAN) from a broad-profile fundamental research institute into one devoted to applied laser research.) *Perestroika* and *glasnost* enabled the institute's scientific collective to express its democratic will in electing as director M.V. Keldysh, who wished to turn FIAN into a federation of loosely associated departments of fundamental research.⁴ The director of LFTI, Zh. I. Alferov, a leading solid state physicist, also set up an "independent federation" of four sectors after Prime Minister N. I. Ryzhkov refused to endorse a breakup of the institute.⁵

One reform on the macroeconomic level involves the creation of MNTKs (*mezhdunarodnyy nauchno-tekhnicheskii kompleks* or interbranch regional scientific-technical associations) to overcome bureaucratic impediments to innovation and increase research productivity. This is especially true in such "sunrise" industries as biotechnology, fiber optics, high temperature superconductivity, and computers, in which the USSR lags far behind the US, Western Europe, and Japan. In theory, each MNTK has at its head an academy institute with engineering and design bureaus, experimental factories, and trade firms, most likely from branch industrial ministries under its jurisdiction. The MNTKs are meant to act like the artificial intelligence and biotechnology firms that have arisen around universities throughout the United States and help bridge the gap between scientific advances and the production process.

A crucial issue is whether the associations will have the wherewithal and authority to succeed where their predecessors, the scientific production associations (*nauchno-proizvodstvennoe obединenie*, or NPO), failed. Some 150 NPOs had been created by 1978 with the aim of accelerating the speed with which scientific advances found their way into production. GOSPLAN, however, treated the NPOs as separate organizations, and they often became mechanical conglomerations whose activities were poorly coordinated. NPOs exist primarily to solve a specific technological prob-

lem in a specific branch or sub-branch of industry; MNTKs, on the other hand, try to move an idea from science into the realm of production. The academy institute is the "initiator and guardian of new ideas." But the MNTKs, like their forerunners, are based on existing institutions, operate through contractual instruments, lack juridical rights, and are weak in relation to ministries and local Party leaders. Even proponents see the MNTK as a prototype certain to encounter significant obstacles in the face of parochial ministerial interests during a time of economic uncertainty. The relative poverty of Academy institutes and the absence of venture capital also present problems.⁶

Nonetheless, the president of the Academy of Sciences, G. I. Marchuk, has endorsed the MNTK as a means of developing the interbranch character of economic activity and moving toward *khozraschet*.⁷ Such scholars as Ye. P. Velikhov (computers and robotics) and B. E. Paton (chemical catalysis, welding) also endorse the MNTK. But Paton, while maintaining his basic faith in the MNTK, is concerned that ministries are unable to coordinate interbranch activities: the hopes for the MNTK are "far from always justified."⁸

The rapid growth of the number of scientific cooperatives suggests that they are the most promising short-term alternative to state budget funding of R & D. Scientific cooperatives are numerous in Moscow, Leningrad, Novosibirsk, and republican capitals. Of one hundred thirty-seven cooperatives registered in Akademgorodok, forty-seven are scientific, connected with academy institutes in such areas as instrument-building, catalyzers, and superconducting films. But while many scholars see the cooperatives as an efficient means of facilitating innovation and raising productivity through market mechanisms, others are concerned that middlemen will profit most and that the government will end up underwriting initial expenses with its facilities and funding without being reimbursed. They argue that institutes and cooperatives would both suffer in the competition for the interests of workers.⁹

The Party, *Perestroika*, and Science

Perestroika set off a reexamination of the role of the Party in the administration of science and technology. At the national level, before the reforms instituted under Gorbachev, research institutes formulated five-year plans which secretaries of Academy divisions endorsed without question. But the central policy bodies — the Academy, the state committee, the Council of Ministers, and GOSPLAN — resisted new approaches to funding, administration, and new fields of re-

3 S. Samoilis, "Ne otkladyvaia na zavtra," *Leningradskaya Pravda*, December 6, 1989, p. 2.

4 A. Zamolodchikov, M. Feigel'man, "Krestnyi otets v maske lidera," *Moskovskaya pravda*, July 28, 1989.

5 Zh. I. Alferov, "Imet' provintsial'nyu nauku — bessmyslenno," *Izvestiya*, November 9, 1989, p. 2.

6 A. Antipov, "MNTK—Deti perestroiki," *Kommunist*, (15) 1989, pp. 86-88. On NPOs, see Julian Cooper, "Innovation for Innovation in Soviet Industry," in Ronald Amann and Julian Cooper, eds., *Industrial Innovation in the USSR* (New Haven: Yale University Press, 1982), pp. 456-470.

7 G. Marchuk, "Akademiya nauk: grani perestroiki," *Partiinaya zhizn*, No. 2 (January 1988), pp. 59-60.

8 *Izvestiya*, December 16, 1989, p. 2.

9 V. Dadykova, "Kooperativy v nauke: zlo ili blago," *Nauka v sibir*, no. 6 (February 17, 1989), p. 2.

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search. Party membership was virtually required of institute directors. (In 1958, B. P. Konstantinov, later vice president of the Academy, joined the Party *after* he accepted the directorship of LFTI.) Party membership is no longer required of institute directors; still, most are Party members committed to Gorbachev's vision of *perestroika*.¹⁰

In the face of limited supplies of equipment, rare materials, and manpower, scientific bureaucrats wielded immense power. Personal contacts were of central importance. When the physicist M. A. Markov wanted to construct a gallium neutrino detector, he turned directly to A. P. Aleksandrov and the Central Committee. Such contacts remain important even today; to get final approval on a long-delayed experimental reactor, the director of the Leningrad Institute of Nuclear Physics in Gatchina had to get Prime Minister Ryzhkov to intervene. This reactor, the 100 megawatt PIK, was required as a replacement for the VVR-M light water reactor built in 1959, by now obsolete in spite of several power upgrades.¹¹

On the local level, new leaders who embrace the notion of democratization have entered Primary Party Organizations in most research institutes, where they are seeking to give the leading role in scientific matters to the scientific collective. In the past, most decisions were made behind closed doors, prestigious bosses dominated decisionmaking on the basis of personal connections, and independent experts seldom were consulted. Local Party secretaries tried to influence all aspects of institute life and often refused to delegate power to experts. As a result, "everyone came to the *partkom* for everything, machinery, instruments, reagents,¹² and creativity and individual initiative were stifled.

Today, however, the Party encourages the formation of independent groups of experts, which in turn exert pressure on traditional organs of science policy to open their doors to newcomers. The Party's major role is in the spheres of housing and food, trade union activities, and public relations. It encourages researchers not to regard the Party merely as an expeditor of materiel and equipment or an agent of ideological control. Researchers are encouraged to take the initiative, search out new sources of funding, and to recover responsibilities long ago usurped by the Party. The Party will continue to be important in overcoming the problems of equipment supply and access to current literature that often plague research efforts in the USSR, but, as policies which recognize scientists as legitimate political actors are put into place, the academic council will be expected to assume all other major functions.

How has the Party encouraged democratization at the institute level of R & D? Recent statutes limiting terms of office to ten years and mandating retirement at age seventy-five will accelerate the departure of such leading Brezhnevite scientific administrators as Academy presidents A. P. Aleksandrov and N. G. Basov. (It is notable that Aleksandrov recently attacked the abuses of science so evident during his years in power without any suggestion that he had contributed to their development.¹³)

Laboratory heads are now elected by the scientific collective rather than being appointed from above, and institute directors are advanced by the academic council of an institute with pro forma approval by the Academy divisions and then its presidium, although there have been some exceptions. Campaigns for institute directorships are covered widely in such national and local newspapers as *Poisk*, *NTR*, *Nauka v sibir*, *Sovetskii fizik* (the institutional weekly of the Kurchatov Institute for Atomic Energy), and bulletin board newspapers (*stengazety*). The goal is to open the process of administration to members of scientific society irrespective of Party membership, and to have the scientific collective participate directly in management of the institute.

The society-wide process of democratization has had significant impact on scientists who are Party members, and who tend to be more liberal than Gorbachev and his followers. Party members of Academy institutes held a meeting in Zvenigorod in late November 1989. Politburo member V. A. Medvedev, ten members of the central committee, and Marchuk were among the three hundred participants. Open, freewheeling discussions predominated over formal presentations. Medvedev spoke of the leading role of the Party, but two-thirds of those attending supported a multiparty system. Fully eighty percent of the participants endorsed the program of the Interregional Group of deputies.

It should be noted that many scientific conservatives have a different vision of the party in *perestroika*. A faceless mass of bureaucrats resists reforms; these so-called *zastoishchiki* risk losing privileges accumulated through years of service. Another group resents the support long given to the non-Russian republican academies and favors the creation of a Russian Academy of Sciences to reverse this trend.¹⁴ There are a few representatives of the view that Russian science has been exploited by minority nationalities of the Soviet Union and is in the hands of a "Judeomasonic" conspiracy. This view, advanced by the reactionary *Pamyat* ("Memory") group in the

10 In natural science institutes roughly 13-18% of all scientists are Party members (in social science ones the percentage is higher, but it is difficult to find consistent data); sixty to seventy percent of laboratory heads belong to the Party, and almost 100% of institute directors; in some institutes about six percent of doctors of science and twenty percent of candidates of science are Party members.

11 Interviews with Academician M. A. Markov, November 29, 1989, Moscow, and A. I. Il'in, secretary of Party committee, Leningrad Institute of Nuclear Physics, December 18, 1989, Leningrad.

12 Interview with Yu. S. Gordeev, secretary of party committee, LFTI, December 15, 1989, Leningrad.

13 A. Aleksandrov, "Ne shtopat' prerekhi," *Izvestiya*, October 13, 1989, p. 3. For a neo-Stalinist administrator coming clean, see V. Trapeznikov, "Paskovat' prometeya," *Pravda*, September 19, 1989, p. 2. Trapeznikov was the head of the Central Committee science department from 1966 to 1983.

14 "Kakoi byt' rossiiskoi akademii," *Sovetskaiia rossiya*, November 24, 1989, p. 3; N. Dubinin *et al.*, "U poroga tysiacheletiya," *Ibid.*, November 13, 1989, p. 3; *Nauka v sibir*, various issues in 1989.

weekly *Literaturnyi Irkutsk*, is most widespread in the Siberian scientific centers.

Reckoning with Past Ideological Interference

In assuming a progressive role, the party must encourage reevaluation of ideological interference that resulted in autarky and dogmatism. Most insidious for Soviet science over the past five decades has been control over conferences, travel, publishing, and access to western literature. This control came under attack in a major document of *perestroika*, *Inogo ne dano* ("There Is No Other Way"), in which the astrophysicist V. L. Ginzburg lambasted the establishment for making the obtaining of approval for foreign travel such a nightmare.¹⁵ After Stalin's death, and particularly after the 1956 visit of Nikita Khrushchev and I. V. Kurchatov, the father of the Soviet atomic bomb, to the British atomic energy facility at Harwell, ties with western scholars began to normalize. But for the most part, only party members and others who had proved their political reliability were able to travel to the West. Thus, while the number of foreign visitors to the USSR increased rapidly, the number of Soviet scientists visiting the West grew slowly after an initial increase.

The Gorbachev revolution has triggered increased international interest in having the USSR become a regular participant in the global science and technology community. The primary prerequisite for foreign travel to conferences or long-term research visits is an invitation from a western colleague. Equally important, censorship of western literature and correspondence has declined, although the bureaucracy created to censor literature and open mail is still in place and functioning. Two years ago I sent a number of my articles to Soviet colleagues; none was received. Western literature is still waylaid by overzealous bureaucrats. More critically, small budgets virtually preclude widescale acquisition of journals. For the sake of comparison, Harvard University receives over 100,000 journals, while the library of the Soviet Academy receives only 5000. Significant bureaucratic and financial impediments also continue to limit foreign travel. Soviet scholars must fly Aeroflot instead of western carriers, and it is often easier to get a visa to travel abroad than to buy tickets; Soviet scholars complain that Aeroflot is now booked fully eight to nine months in advance. The limitations on foreign travel have taken on a new face.

Glasnost has unleashed discussion of the effect of the purges on the sciences. Scientists actively participate in the

anti-Stalinist Memorial movement. Recent articles in daily newspapers and such journals as *Priroda*, *Nauka i zhizn*, and *Khimiia i zhizn* have examined the history of Soviet astronomy, theoretical physics, plate tectonics and biology.¹⁶ These have documented the destruction of the staff of the Main Astronomical Laboratory at Pulkovo, the arrest and execution of some of the most promising young theoretical physicists in 1937, and the rejection of plate tectonic theory in the Brezhnev years.

Glasnost has also fostered disputes over efforts to discredit those seen as responsible for the creation of the administrative-command system of science. There have been attacks on such alleged examples of scientist/administrators who accumulated huge fiefdoms during the Brezhnev period of "stagnation" as Yu. A. Ovchinnikov, who before his recent death was a vice president of the Academy, director of the Shemiakin biology institute, main editor of a leading journal, member of central committee, and deputy to the Supreme Soviet — while somehow managing to coauthor one hundred articles per year. His detractors asserted that, out of pride and embarrassment, Ovchinnikov obstructed the development of an experimental drug ("blue blood") that functions like blood, which had been produced by a provincial scientist without the resources of Ovchinnikov's institute; the scientist eventually committed suicide. A. A. Logunov, another Academy vice president, rector of Moscow State University, chair of several all-union scientific councils, editor of *Teoreticheskaya i matematicheskaya fizika*, and member of the Supreme Soviet and the Central Committee, was accused of using his positions to subvert the general theory of relativity.¹⁷ V. L. Ginzburg attacked Logunov with a vigor that suggests he sees in Logunov's work similarities to the anticosmopolitan campaign of the *Zhdanovshchina* (1947-49) against relativity theory.¹⁸ Logunov, perhaps surprised by the tone of the attack, criticized his detractors for using "Lysenkoist" tactics in a newspaper article voicing objections to his theories, when their "validity should be discussed in [scientific] journals."¹⁹

On the whole, ideological factors play a decreasing role in Soviet science. The Stalinist heritage of pseudoscience and ideological interference has been replaced by widespread faith in science and technology as a panacea for social and economic problems. Ideological seminars for the natural sciences, noteworthy for their attempts to differentiate between "bourgeois" and "proletarian" science virtually ceased in the late 1950s. Similarly, academic councils have abandoned the conservative mind set based on the primacy of the party (*partiinnost*) and the collective over the individual (*kollektivnost*).

15 V. L. Ginzburg, "Protiv byurokratizma, perestrahovki i nekompetentnosti," in V. I. Evsevichev, et al., *Inogo ne dano* (Moscow: Progress Publishers, 1988), pp. 135-153.

16 E. g.: N. V. Uspenskaya, "Vreditel'stvo...v dele izucheniya solnechnogo zatmeniya," *Priroda*, 1989 (8), 86-98 and A. D. Chernin, V. Ya. Frenkel', "Vozvrashchaetsya G. A. Gamov," *Priroda*, 1989 (9), 82-102.

17 A. Zamolodchikov, M. Feigel'man, "Krestnyi otets," *op cit*. See Nonna Chernykh, "Istoshchenie: pochemu ugasaet nauka v gorode nauki," *Ogonek*, 1990 (4), pp. 9-12, for a general indictment of party interference which led to the decline of Obninsk as a center of nuclear science.

18 See A. A. Logunov, "Novaia teoriia gravitatsii," *Nauka i zhizn*, 1987 (2), 38-44, and *Ibid.*, 1987 (3), 60-70; and V. L. Ginzburg, "Obshchaya teoriya otnostel'nosti," *Ibid.*, 1987 (3), 41-48, and "Zametki po povodu..." *Ibid.*, 1988 (6), 114-119.

19 A. Logunov, "Lichnykh interesov u menya net," *Moskovskaya pravda*, August 4, 1989.

The Supreme Soviet and Science and Technology Policy

Decentralization and democratization of science policy have led to increasing prominence of specialists in contemporary Soviet politics and the science policy process. One aspect of this is the creation of independent professional societies and science advisory committees in higher Party and government bodies. In the past, scientists' membership in the Central Committee and Politburo has usually been tied to a post — for example, president of the Academy, chairman of GKNT — rather than to individual achievement; no more than three or four percent of Central Committee members are scientists.²⁰ It may have been a remnant of Stalin's antitechnocratic sentiment that kept more scientists out of prominent political posts.²¹ But power in science policy is shifting to the Supreme Soviet.

Scientists have assumed a leading role in the Congress of Peoples' Deputies. An interest group of one hundred deputies from Academy institutes has been created. One-eighth of all deputies of the Supreme Soviet are natural or social scientists; a significantly greater number appear to hold advanced scientific or engineering degrees.²² There are twenty-five representatives of the medical profession, twenty-two natural scientists, including fourteen physicists, and twenty-two social scientists. A subcommittee on education, science, and culture has begun to play an active role in science policy. Partly in response to these groups' concern about pressure for *khozraschet* in fundamental science research, the government recently allocated more funds for basic research.

The nomination process for the elections to the Soviet parliament foreshadowed the progressive role the Supreme Soviet has begun to play in science policy. The eight candidates endorsed out of a slate of twenty-five did not include such popular scientists as Andrei Sakharov. A spontaneous Academy-wide demonstration forced the presidium to reconsider its nominees, and resulted in Sakharov, R. Z. Sagdeev, and others being placed on the ballot. There is evidence that the presidium acted not as an arm of the Party, but as a corporate entity, hoping to nominate more "establishment" scientists. Some Party scientists believe that the presidium erred in holding a secret vote on this matter.

The Supreme Soviet differs from western legislatures in a number of ways concerning science and technology policy. It has no staff of experts for policy advice; it relies on a wide range of committees of its overworked members. It lacks ready access to scientific and technical advice, although the increasing prominence of professional societies suggests they will soon play that role — as well as the role of lobbyists. One

deputy proposed the creation of standing committees and consultancies to deal with this lack of expertise in science policy.²³ A committee on "social expertise" has been formed to provide the government with independent technology assessment.²⁴ It is not clear how the traditional organs of science policy and the Supreme Soviet will work together, but independent organizations of experts will play a major role.

Experts and the Policy Process

There has been a resurgence of independent professional organizations of scientific experts. All independent professional organizations — architects, lawyers and engineers, biologists and physicists — were disbanded by the Party in the 1930s. The Party feared independent loci of power, especially among groups with special expertise, and it brought to bear all of its weapons of control, including coercion, purge, arrest, and execution. The development of new official and unofficial professional organizations and institutions akin to "think tanks" on strategic, economic, and other issues indicates that they may already be firmly entrenched and compete with traditional policy bodies for influence.

Gorbachev has surrounded himself with an informal science advisory committee including such physicists as Ye. P. Velikhov, R. Z. Sagdeev, Zh. I. Alferov, and several economists. Owing to worldwide prestige gained from forty years of achievements, Soviet physicists exercise significant authority in leading Party circles. The construction of the nearly completed 3000 GeV proton accelerator, UNK, and a new linear accelerator in Protvino, and the imminent completion of the T-15 Tokamak fusion reactor at the Kurchatov Institute for Atomic Energy, underscore the government's view that "big physics" should remain at the center of national attention: it produces economic benefits, generates international prestige, and attracts international collaboration in a wide range of fields important to the Soviet economy.

Organizations such as the Physics Society of the USSR, Union of Scholars of the USSR, the Nuclear Society, and the Chernobyl Society have been formed to assist the government formulate science policy with three goals in mind: to defend specialists' professional interests; to provide the government with independent expertise to ensure well-informed decisions in science and technology policy; and to combat incipient antiscience attitudes among the Soviet population. In other republics — Estonia, Latvia, and Belorussia — physics, biology, and chemistry societies have sprung up. The Union of Scholars sees itself as challenging the authority of the Academy of Sciences, which it views as too conservative in matters of science policy.

20 Fortescue, *The Communist Party*, pp. 65-74.

21 Kendall Bailes, "The Politics of Technology: Stalin and Technocratic Thinking Among Soviet Engineers," *American Historical Review*, Vol. 79 (April 1979), 445-469.

22 *Izvestiya*, June 1, 1989, pp. 2-3.

23 K. Smirnov, "Chemu uchit'sya deputatu," *Izvestiya*, December 5, 1989, p. 4.

24 N. Krivomazov, "Parallel'nye — skhodyatsya," *Pravda*, November 12, 1989, p. 1.

Among the first societies created in the Gorbachev period is the Physics Society, formally established in November 1989 after meeting periodically for the preceding two years. Physicists, at 400,000 strong, are the largest group of academic specialists in the USSR apart from engineers. Their authority and reputation, so high in the Sputnik era, has fallen because of their alleged responsibility for the arms race with the US, environmental degradation, and, in particular, the Chernobyl disaster. The Society's primary goals are to protect the professional interests of physicists, promote better teaching and research conditions, discuss social and scientific responsibility, and combat antiscientific tendencies in the USSR.

Scientists have created a number of groups concerned with questions of ecology. The Chernobyl Union, a national, voluntary, independent social movement, was created in 1989 to prevent future atomic accidents, raise awareness of environmental issues, organize universal radiation education, and offer support to those who suffered in the Chernobyl disaster. It will conduct studies of the disaster area, fight bureaucratic delays, and establish independent expertise by training atomic specialists. The union has called for the creation of the legal framework to regulate nuclear power through the Supreme Soviet and the courts. It will endorse candidates, organize an institute and press center, and hold annual conferences.²⁵

But the burgeoning ecology movement has begun to run into problems created by economic pressures. The government appears unlikely to sacrifice investment capital on scrubbers for coal-fired generators. Scientists argue that coal, construction, and other industries must be subject to effective regulatory constraints to ensure worker and environmental safety. But an uneducated public and a government more concerned with development are unlikely to adopt western safety standards overnight. For example, asbestos is used extensively by three new all-union construction cooperatives formed in 1989.

Another problem is the fact that physicists and economists have gained significant authority in leading Party circles. The danger lies in a widespread belief in the USSR that science and technology are infallible; this led indirectly to such disasters as Chernobyl. Problems also arise from the absence of an institutional structure to settle disputes among experts. Faith in expensive large-scale technological projects persists at the expense of those with more immediate social utility. The Soviet science advisors may fail to find secure institutional foundation to compete with the industrial ministries and state committees that in the past coopted scientific expertise for parochial interests.

The Public and Science

Poised against scientists' newly found academic and political freedom are the public's wideranging antiscientific at-

titudes, mistrust, and radiophobia. *Glasnost* has led to greater public awareness of the potential social costs and environmental dangers of unregulated science and technology. Discussion of the Chernobyl disaster, the failure of the Phobos 1 and 2 Mars probes, publicity over the recently scuttled plan to divert the flow of Siberian rivers from north to south, and previously suppressed reports of lethal accidents have called into question support for such large-scale technology projects as reactors, satellites, and particle accelerators. Members of the opposition Interregional Group of deputies of the Supreme Soviet, including Boris Yeltsin and Yuri Afanasyev, question the efficacy of funding for "big science," and a number of public groups have formed which share this sentiment. Many citizens cannot understand how it is possible to fund big science when consumer goods, food, and medical care are in short supply.

Most public activity surrounds a burgeoning ecology movement. The republican and national writers' unions have played a major role in publicizing environmental dangers through journals of the republic unions (*Sibirskie ogni*, *Raduga*, *Neva*) and through such weeklies as *Literaturnaya gazeta* and *Golos rodiny*. Progressive party weeklies (*Nedelya* and *Sobesednik*, for example) contribute to environmental awareness. Sparked by Chernobyl, the movement has gained strength; newspapers chronicle the environmental destruction wrought by profligate use of natural resources and intensive economic development — ruined rivers and lakes, land poisoned by pesticides, air polluted by outmoded factories and obsolete automobile engines.

There are several chapters of Soviet "Greens," and although they are less sophisticated than their European counterparts, pressure from them has already played a part in convincing the state to cancel ten nuclear reactors and several hydropower projects. A number of experimental reactors have been shut down or put on public notice in Moscow and Leningrad. Coming at a time of projected electrical energy production shortfalls and economic crisis, these successes testify to the strength of the burgeoning environmental movement.

Radiophobia encouraged by the sale of food contaminated with radioactive cesium is rampant. Scientists and government alike realize that the best way to deal with radiophobia is through education. Report cards on nuclear reactor "events" and "losses of power" and radiation levels in all cities appear regularly in the press. The press frequently publishes measured articles discussing the dangers of radioactivity. But exposés of the disaster, bureaucratic mismanagement, the continued suffering of the Chernobyl victims, and children playing under "Danger — Radiation" signs contribute to the development of the so-called Chernobyl syndrome.²⁶

Medicine is another area of public concern. For years, good medical service has been a privilege of the elite. That

25 *Ustav soyuza Chernobyl*, June 27, 1989. See *Chernobyl: sobytiia i uroki* (Moscow: Izdatpolit, 1989), a handbook which was put out with the help of the Chernobyl Union.

26 G. Medvedev, "Chernobyl'skaya tetrad," *Novyi mir* (6), 1989, pp. 3-108; A. Golovkov, "Poluraspad," *Ogonek*, No. 34 (August 1989), pp. 6-8, 30-32 and Simon Kordonskii, "Printsipy zony: lyudi i vlast v Chernobyle," *Vek xx i mir*, 1989 (9), 17-21. *Vek xx i mir* is a new, progressive social and political monthly.

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privilege is now under attack, but performance has not improved. Emergency rooms are overcrowded and filthy. Heart and lung disease are on the increase. Infant mortality is three times higher than in the US, and prenatal care resembles that in a developing country. Such technologies as CATSCANS and dialysis machines, and most modern drugs, including some antibiotics, aspirin, and ibuprofen, are not widely available. Epidemics of dysentery and hepatitis occurred during my visit to the USSR.

There are no throwaway hypodermic needles; on several occasions, scores of schoolchildren contracted AIDS from contaminated needles. Independent groups have established telephone hotlines and publish informational newspapers on AIDS (*Spid-info*) which are often sold out in minutes. But there are no condoms: I visited 36 drug stores in Moscow, Leningrad and Novosibirsk, and found them in only one store. So there is no "safe sex," and abortion continues to be the major form of birth control. The laboratories of such leading centers of biomedical research as the Shemiakin Institute are at least five years behind western ones and simply cannot overcome the backwardness and poverty of Soviet medicine overnight. The public holds scientists responsible. It is not surprising that holistic medicine and acupuncture are on the rise.

More striking is the proliferation of peasant home remedies and the fascination with medical charlatans who offer curative psychotherapy over the television. Every week, A. Kashpirovskii conducts two-hour hypnosis sessions over national television to millions of educated and uneducated Soviets who hope to be healed, have scars disappear, and so on. Tickets to attend the sessions cost 100 to 500 rubles (as much as two times the average monthly salary). Other healer "lay on" hands and claim to transmit psychic energy to inanimate objects.

The tendency toward the pseudoscientific has found response in long latent interest in UFOs. Sightings of extraterrestrials are reported almost every week. This trend is all the more surprising in light of declining public support for the space program.

In spite of tensions produced by a public wary of the products of science and technology and by scientific bureaucrats who resent the loss of their authority, the Soviet scientist has assumed a leading position in *perestroika*. Increasingly, the party and government have turned to scientists for help in economic, political, and social reform. Gorbachev and the apparatus rely heavily on scientific advice; many of the leading figures of the Supreme Soviet are specialists. Scientists were Brezhnev's dissidents; they are among Gorbachev's major supporters. It is not surprising that those whose day-to-day work concerns the free exchange of ideas would be among those most responsive to the call of party leaders to support reform throughout Soviet society.

Perestroika and *glasnost* have set off irreversible processes in reform of the research and development apparatus. From the conduct of research in the laboratory and the administration of the scientific institute to the role of the specialist in the policy process and the relationship between the public and scientist, the face of Soviet science and technology changes every day.

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